

**CLAIMS**

1. A sensor for monitoring gas content, the sensor comprising:
  - a housing defining at least two cavities;
  - 5 a resonating structure positioned in each of the cavities, each of the resonating structures having a resonant frequency dependent upon a physical characteristic of a gas in its respective cavity;
  - means for exciting the resonating structures to generate output signals therefrom; and
  - 10 means for comparing the output signals from each of the resonating structures and outputting a comparison signal indicative of one or more differences between the resonant frequencies of the at least two structures and the relative gas content of the cavities.
- 15 2. A sensor according to claim 1, further comprising a passageway associated with each cavity; and
  - means for controlling flow of atmospheric gas into the cavities via their respective passageways.
- 20 3. A sensor according to claim 1, or claim 2, wherein the physical characteristic is density.
4. A sensor according to claim 3, wherein each resonator structure includes at least one compliant element and at least one inertial element.
- 25 5. A sensor according to claim 1 or claim 2, wherein the physical characteristic is the speed of propagation of sound through the gas.
6. A sensor according to claim 5, wherein the resonator structure includes at least one spring element and at least one perforated mass element.
- 30 7. A sensor according to any preceding claim, further comprising at least one filter unit positioned to prevent entry of solid and liquid contaminants into at least one of the cavities.

8. A sensor according to any preceding claim, wherein the one or more resonator structures are formed from a micromachined silicon structure.

5 9. A sensor according to any preceding claim, wherein the means for exciting the resonating structures and for comparing the output signals is provided by at least one application specific integrated circuit (ASIC).

10 10. A sensor according to claim 9, wherein the ASIC further comprises at least one of a component for self- diagnostics, a component for digital communication, and a component for advanced signal processing.

11. A sensor according to any proceeding claim further comprising a pressure equalization member positioned between the cavities.

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